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ABSTRACT

A structural model of school learning was tested to examine both direct and indirect influences of previous grades, quality of instruction, motivation, quantity of instruction, and homework on Hispanic-American eighth-grade students' academic achievement, while controlling for background variables. The model was analyzed with path analytic techniques using a sample of 2,721 eighth grade students from the National Education Longitudinal Study of 1988 (NELS:88). The achievement of Hispanic-American students was strongly influenced by previous grades, motivation, quantity of instruction, and homework. The most influential background variables were family background and English proficiency, while gender had a small but meaningful influence, indicating that boys do better than girls on achievement. These results support both the variables tested and the framework derived from school learning theory. An appendix describes the NELS:88 items and composites, and two tables and two figures illustrate the discussion. (Contains 50 references.) (Author/SLD)

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What Influences Eighth-Grade Hispanic Students' Academic Achievement?

A Structural Equation Analysis

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ABSTRACT

A structural model of school learning was tested to examine both direct and indirect influences of previous grades, quality of instruction, motivation, quantity of instruction, and homework on Hispanic-American eighth grade students' academic achievement, while controlling for background variables. The model was analyzed with path analytic techniques and using the National Education Longitudinal Study of 1988 (NELS:88). The achievement of Hispanic-American students was strongly influenced by previous grades, motivation, quantity of instruction, and homework. The most influential background variables were family background and English proficiency, while gender had a small but meaninfgul influence, indicating boys doing better than girls on achievement. These results support both the variables tested and the framework derived from school learning theory.

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What Influences Eighth-Grade Hispanic Students' Academic Achievement?

A structural Equation Analysis

"The road to academic success is under construction" is what the sign reads when Hispanic-American students' academic progress is evaluated. Hispanics have lower enrollments in preprimary and kindergarten (Ogle, 1990), and performance below the level of white and Asian-American students in basic academic subjects (Mullis, Dossey, Owen, & Phillips, 1991). In fact, Hispanic-American students drop out from high school at higher rates than do white students (Ogle, 1990), and are less likely to attend college than other ethnic groups (St. John, 1991). Once in college, Hispanic students are more likely to drop out than any other student (Davis, Haub, & Willete, 1988). Thus, Hispanic students are often perceived as educationally disadvantaged and more likely to fail in school, and it is no wonder they are usually associated with low socioeconomic status (SES) occupations (Pallas, Natriello, & McDill, 1989). The situation is not encouraging. However, even though there is an agreement that the "road to academic success" for Hispanic students should be fixed, it is still not clear what conditions influence academic performance and social development of minority groups, Hispanics included (Myers & Milne, 1988; Ogbu, 1992).

School Learning Models

Ogbu (1992) suggested that school success cannot be explained by cultural and language differences alone. He argued the school context and the culture and language of the dominant group in which minorities have to function, are also important. Indeed, there is a need to understand school learning influences in a multicultural context to develop effective

and culturally sensitive instructional applications (Ogbu, 1992). School learning theory should provide a method for developing such applications, but the body of school learning theory shows a lack of integration because of differences in approaches and interpretation (Bigge, 1992). School learning theories, nevertheless, have influenced the development of school learning models representing both learning and instruction in a systematic fashion in classroom settings (Fraser, Walberg, Welch, & Hattie, 1987; Haertel, Walberg, & Weinstein, 1983), and may be adequate for the study of minority groups if appropriate consideration is given to background variables (T. Z. Keith & Benson, 1992).

Common Factors Across School Learning Models

Various school learning models have described influences on individual learning, and have provided suggestions for curriculum development and instructional applications in the classroom. In spite of the apparent incongruities in definitions, theoretical affiliation, and model design, four essential components can be identified across models of school learning. These four factors are: previous achievement (ability), motivation, quality of instruction, and quantity of instruction as a measure of time on task (see Fraser et al., 1987; Haertel et al., 1983). Although homework was not found common across models of school learning, it was included in this study because of its important relation with achievement that appears to hold for younger students and for various academic subjects (T. Z. Keith & Page, 1985b).

Previous achievement. What the student brings to the learning situation appears to be a definite prerequisite to explain optimal learning (Haertel et al., 1983). Three constructs, prior achievement, cognitive ability, and task-specific aptitude, are usually associated under

the broad concept of ability in holistic models. Cognitive entry behaviors and prior achievement, in particular, are strongly emphasized in theories of learning. Bloom (1976), for example, included reading comprehension and verbal intelligence in cognitive entry behaviors, and indicated a strong correlation between prior and final achievement, while Walberg (1986) suggested that cognitive ability and previous achievement are good predictors of student academic performance. In any case, it is necessary to have a measure of ability or previous achievement (e.g., previous grades) when studying the influences on academic achievement (Walberg, 1986).

Motivation. Motivation is another essential component across models of school learning, but different interpretations and operational definitions are often found. Researchers have described motivation as the willingness to invest time in mastering a learning objective (Carroll, 1989; Walberg, 1981), affective entry behaviors (Bloom, 1976), and predisposition to learn (Bruner, 1966). The model of Keeves (1986) emphasized the concept of achievement motivation, while others considered motivation as either intrinsic or extrinsic forces that promote learning (Cooley & Leinhardt, 1975; Harnischfeger & Wiley, 1976). Whatever the definition of motivation, its contribution as a mediating variable to learning outcomes has been well documented (Uguroglu & Walberg 1986; Walberg, 1986).

Several studies have demonstrated that intrinsic motivation may be a more consistent influence on learning because it increases perceived cognitive competence and self-confidence (e.g., Deci, Nezlek, & Sheinman, 1981; Spaulding, 1992), hard working attitudes and willingness to face personal challenges (Ames & Archer, 1988), and enthusiasm toward a school subject (Bloom, 1976). Additionally, some studies have suggested the need to include

educational aspirations as an important component of motivation (Walberg, 1981), especially when conducting research on Hispanic students (NCES, 1992a). At any rate, multiple indicators of motivation are more likely to improve predictions on achievement than single indicators alone (Uguroglu & Walberg, 1986).

Quality of instruction. Several constructs have been used to define quality of instruction, including attitudes toward teachers (Cooley & Leinhardt, 1975; Harnischfeger & Wiley, 1976), clarity of instruction and matching of tasks to student characteristics (Carroll, 1989), cues and reinforcements (Bloom, 1976; Cooley & Leinhardt, 1975), feedback and correctives (Bloom, 1976; Bruner, 1966), and organization of materials and promotion of self-learning (Bruner, 1966).

Further, students' attitudes toward teachers, subject matter, and class environment have been used to measure quality of instruction under Walberg's model of educational productivity (Fraser et al., 1987). Due to the broad nature of quality of instruction, Fraser and colleagues stressed however, the predictive power of individual measures has been somewhat inconsistent. Walberg (1986), for instance, indicated that small but consistent positive results are usually found in studies evaluating quality of instruction for large samples of high school students. A combination of indicators of schooling with factors relating to teaching effectiveness, as perceived by both students and parents, has been suggested to measure quality of instruction when comprehensive information is available (NCES, 1990b).

Quantity of instruction. Quantity of academic instruction (coursework) or some other measure of time on academic tasks has been found essential in school learning models.

Carroll (1989) argued that time, defined as opportunity to learn, is essential for academic learning. Other models also described quantity of coursework as a fundamental component under several labels such as pupil pursuits, total active learning time, quantity of schooling, and time allocated to curriculum activities (Bloom, 1976; Cooley & Leinhardt, 1975; Harnischfeger & Wiley, 1976; Walberg, 1981). Strong evidence of the correlation between quantity of coursework and achievement has been also provided by several sources (e.g., Bloom, 1976; Walberg, 1981). These findings have been confirmed using different samples, different methods of analysis, and varying definitions of quantity of instruction (Alexander & Pallas, 1984; T. Z. Keith & Page, 1985a).

Homework. Even though time spent on homework is not found essential across models of school learning, its influence on achievement outcomes has been recognized as important in various studies on elementary (Paschal, Weinstein, & Walberg, 1984) and high school students (T. Z. Keith & Page, 1985b). Homework can be also considered in terms of time engaged on a learning task, and the willingness or motivation to work on learning activities (Carroll, 1989; Walberg, 1981). The variable homework is included here because it is an important learning tool for young students, because it can compensate for lower ability of less able students through increased homework, and because it is potentially manipulable by schools, parents, and students (T. Z. Keith & Page, 1985b).

Family Background Variables

Banks (1989) and Ogbu (1992) argued it is necessary to emphasize family background variables in research involving minority groups as means of improving our understanding of

minorities and immigrants' school achievement. However, much research is conducted on white student samples and with the variables gender, ethnicity, English proficiency, and SES overlooked, even though these variables tend to correlate with achievement (Myers & Milne, 1988).

Although reports on the size of family background influence on Hispanics are inconsistent, it appears this variable has an important effect on their academic achievement (P. B. Keith, 1992; NCES, 1992a). Family background is often used to control for background characteristics in research involving school learning (Scarr, 1988), but this variable has not been examined at a more rigorous level (e.g., direct and indirect effects for ethnic groups). Likewise, it has been reported that English proficiency has an important effect on Hispanic students' educational aspirations and achievement, implying that students with higher proficiency are more likely to set greater educational goals and are more motivated to raise their achievement (Jorgensen, 1983; Myers & Milne, 1988). Gender is another important variable that should be included in the study of Hispanic students because of the traditional roles imbedded in the Hispanic culture (Garza & Lipton, 1984). Lower academic expectations are often associated with Hispanic female students, a cultural phenomena that appears to have negative implications on their academic motivation and achievement.

It is evident variables of previous achievement, quality of instruction, motivation, quantity of instruction, and homework, or their closely related measures, have important and meaningful influences on school learning (Fraser et al., 1987; Haertel et al., 1983). There is also evidence to support family background, English proficiency, and gender as important

background influences that need to be considered when studying Hispanic students (Myers & Milne, 1988; NCES, 1992a). However, few researchers have studied the direct and indirect effects of these variables simultaneously. Even fewer investigators have examined school learning models on Hispanic-American students (Myers & Milne, 1988), and very limited research has focused on early adolescents when they are exposed to critical factors which may influence them later in their lives.

The purpose of this study was to determine the extent of the direct and indirect influence of previous achievement (measured by previous grades), quality of instruction, motivation, quantity of instruction, and homework on Hispanic-American eighth grade students' academic achievement, while controlling for important background variables (family background, student's English proficiency, and gender). See Appendix A for a description of variables.

Method

Dataset

Data for this research were drawn from the National Education Longitudinal Study of 1988, identified as NELS:88 and sponsored by the National Center of Education Statistics (NCES, 1990a). NELS:88 included a large, representative sample of public, private, and parochial schools. The schools were first selected using a stratified sample design to ensure proportional representation by regions, and size and type of community. In the second stage of sampling, students were selected at random from chosen schools with an average of 26 students drawn per school. NELS:88 is a multi-faceted study including self-administered questionnaires and four achievement tests. The questionnaires provide information on the

students, parents, teachers, and the school. Only the student and parent surveys (return rates over 93%) were used in this study.

Subjects

This research included 2,721 eighth grade students drawn from the NELS:88 survey who identified themselves as of Hispanic origin. The majority of those students are of Mexican or Mexican-American descent (62%), whereas 11% have ties to Puerto Rico and 4% to Cuba. Female students comprised 51.4% of the sample, while males constituted 48.6%. Hispanic children are disproportionally associated with low income families (38% reported income less than $15,000), and more likely than other groups to have poorly educated parents (31.4% of parents had not finished high school). Low SES occupations are also common for Hispanic students. Fathers' occupations most frequently represented included operative (27.2%), craftsperson (19.4%), laborer (10.9%), service (9.8%), and agriculture/administrator (7.3%); whereas mothers' occupations most frequently identified were described as homemaker (28.9%), service (23.8%), clerical (16.3%), and operative (11.6%). About three-fourths reported bilingual homes, about two-thirds indicated high English language proficiency, and over 75% come from intact homes. The majority of Hispanic students (90%) attend public schools mostly located in the West (41.8%), and the South (34.4%). For a complete report of background information see NCES (1990a, 1990b) survey reports.

Variables

The selection of variables and NELS:88 items was based on previous research (e.g., Cool & T. Z. Keith, 1991; T. Z. Keith & Benson, 1992), models of school learning (Fraser et

al., 1987; Haertel et al., 1983), convention, judgement, and statistical analysis. The effects of family background variables were controlled in this study but their causes were not part of the model under consideration. The variables family background, English proficiency, and gender were considered exogenous, while previous achievement, quality of instruction, motivation, quantity of instruction, homework, and achievement were considered endogenous variables in the model shown in Figure 1. For a complete description of selected items, achievement tests, and composites for the variables used in this study, see Appendix A.

Analysis

Path analysis was used to estimate the direct and indirect effects of the school learning variables and homework on Hispanic-American eighth grade students' academic achievement, while controlling for important background variables as outlined by the model shown in Figure 1. The variables included in the model make up a simple, recursive path model with a "weak causal ordering" represented by the arrows, and indicating academic achievement as the outcome variable. There is no assertion of direct causal relation conveyed by the arrows; the paths only imply the direction of the influence between two variables <u>if</u> they are causally related. The path coefficients indicate the extent of the direct effects from a presumed cause to a presumed effect in terms of standard deviation units. The path coefficients can, under certain circumstances, be estimated by beta weights from multiple regression analysis. Correlations between exogenous variables are indicated by curved lines without assignation of causal relations. Short and unlabeled arrows represent unspecified influences outside of the model (path residuals) estimated as the square root of $1-\underline{R}^2$.

Insert Figure 1 about here

Path analysis is a powerful strategy of analysis for nonexperimental research because it provides for considerations to handle problems involved in the analysis of such research (see T. Z. Keith, 1988a, 1988b, in press). Path analysis also allows for simultaneous evaluation of the direct and indirect effects of all mediating variables while controlling for background variables (for specific details on path analysis see Pedhazur, 1982). The term "direct effect" of an independent variable on a dependent variable refers to the proportion of the effect attributed to the independent variable involved, only. "Indirect effect" describes the partial effect of an independent variable through one or more variables (Pedhazur, 1982, chap. 7).

It is important to note here that the application of path analytic techniques involves the modification of the specified model to best explain the data of interest (see Joreskog & Sorbom, 1989 for a discussion of model fitting). Thus, the results presented herein are based on the final version of the model. The overall fit of the resulting model was evaluated by means of chi-square (χ^2), adjusted goodness-of-fit index (AGFI), and root mean squared residual (RMSR) measures. The computer program LISREL 7 (Joreskog & Sorbom, 1989) was used to estimate the causal effects of the model using pairwise deletion of missing data in all analyses.

Results and Discussion

The correlations among the variables, their means, and standard deviations (in the units used in this analysis) are presented in Table 1. The results of the initial analysis

indicated a path of -.004 from quality of instruction to achievement. This result was consistent with previous research and relevant theory, suggesting meaningful total effects but no direct effects from quality of instruction on achievement (Carroll, 1989; T. Z. Keith & Benson, 1992; Walberg, 1986). Thus, based on previous evidence, this path was constrained to zero and measures of goodness of fit were then estimated for the modified model.

Insert Table 1 about here

Figure 2 shows the final version of the path model explaining achievement as a function of school learning variables, while controlling for background characteristics. Fit statistics suggest a reasonable fit to the data. Some paths were statistically significant (i.e., with a probability of less than .05 or a t-value greater than 1.96) but only those paths of .05 or greater were considered meaningful (Pedhazur, 1982, chap. 15). Meaningful paths were interpreted qualitatively as indicating small, moderate, or strong effects (see T. Z. Keith, in press).

Direct Effects on Academic Achievement

The strongest direct influence on achievement was observed from previous achievement as measured by previous grades, with a path of .260. Student's previous grades appear to have a powerful influence on academic achievement, as measured by standardized tests. The size of this effect on academic achievement is consistent with results reported in previous research (T. Z. Keith & Benson, 1992; T. Z. Keith et al., 1986). Clearly, students with a history of good grades are more likely to achieve at a higher level than are students with a record of low grades.

Insert Figure 2 about here

Motivation had a moderate influence (.156) on achievement, suggesting that students who have higher educational aspirations, who are more confident (not afraid of asking questions in class), and who perceive themselves as competent tend to achieve at a higher level than do other students with contrasting patterns of motivation. Similar results have been reported for Hispanic eighth grade students' educational aspirations (NCES, 1990b, 1992a), and high school Hispanic students' motivation (T. Z. Keith & Benson, 1992).

The path from quantity of instruction to achievement was moderate (.111), suggesting that increased enrollment in available regular coursework and decreased attendance to remedial mathematics and English courses improve academic achievement, even when previous achievement is controlled. Using different measures for quantity of coursework, other researchers have found paths from quantity of coursework to achievement as high as .289 for high school senior Hispanic students (T. Z. Keith & Benson, 1992) and .339 on the general senior student population (Cool & T. Z. Keith, 1991).

Time spent on homework had a small but meaningful influence on achievement. The resulting path (.070) suggests that spending more time on homework has a positive influence on academic achievement. Indeed, how students spent their time outside the school has important implications for their learning and social development (T. Z. Keith & Page, 1985b).

The path from family background to achievement was the second strongest influence (.220) in the model, indicating there is an increase in the level of achievement as the SES of the Hispanic family improves. This result is also consistent with previous research (P. B. Keith, 1992; Myers & Milne, 1988; Walberg, 1986) suggesting large direct influences from SES on achievement. The path from student's English proficiency (.148) suggests a moderate effect on achievement, implying that students who are more proficient in reading, writing, speaking, and understanding spoken English, achieve at a higher level than do students with lower level of proficiency. Other studies have indicated similar results (e.g., Myers & Milne, 1988; NCES 1990b, 1992a). The influence of gender on achievement was small but meaningful (-.074), suggesting that male students achieve at a higher level than females (males were coded 1 and females 2), once other variables in the model are controlled. The size and direction of this influence is consistent with previous research on high school Hispanic students (Myers & Milne, 1988), the general high school student population (Cool & T. Z. Keith, 1991), and eighth grade Mexican-American students (P. B. Keith, 1992).

Direct Effects on School Learning Variables

Influences on homework. Moderate effects on homework were observed from motivation (.103) and previous achievement (.111), and small but meaningful effects from quantity (.058) and quality (.087) of instruction. Time spent on homework appears to increase when students have consistently good previous grades, are more motivated, have good things to say about quality of instruction and schooling, and are engaged in more coursework.

The variable family background produced moderate direct effects (.065) on homework, while the path from student's English proficiency (-.057) suggests a decreased involvement in homework as English proficiency increases. That is, a student with greater resources at home and with higher English proficiency, is more likely to finish homework faster than a student of poor family background and low English proficiency.

Influences on quantity of instruction. Differences in course-taking (quantity of instruction) can be attributed to moderate effects from motivation (.112), previous achievement (.108), English proficiency (.105), and to a small but meaningful influence from gender (.051). These influences suggest those students who are most motivated, have good record of previous grades, and who are more proficient in the English language, will be more likely to take more regular coursework and more unlikely to enroll in remedial instruction.

Influences on motivation. The strongest influence on motivation resulted from previous achievement (.424), while the quality variable (.158) along with English proficiency (.165) and family background (.139) had moderate effects. The impact of previous achievement is strikingly high (.424) when compared to other results (using different measures of ability) derived from the general high school student population (Cool & T. Z. Keith, 1991; T. Z. Keith & Benson, 1992), and at-risk high school senior students (Anderson, 1991). At any rate, the influence is consistent with previous research suggesting that better previous grades lead to higher motivation. Other paths indicating moderate effects suggest that students who are more affluent, more proficient in English, and who hold a positive

perception of instructional quality and schooling, will tend to be more academically motivated.

Indirect and Total Effects on Academic Achievement

In addition to the pattern of direct effects, indirect and total effects provide valuable information about influences that may otherwise go unnoticed (Cool & T. Z. Keith, 1991; T. Z. Keith, 1988a, 1988b). Direct, indirect, and total effects are presented in Table 2.

Insert Table 2 about here

Indirect effects. Previous achievement had meaningful indirect effects (.103) on academic achievement via motivation, quantity of instruction, and homework. Family background had moderate indirect effects (.083) on academic achievement through previous achievement, motivation, and homework. Similarly, student's English proficiency showed moderate indirect effects (.061) through previous achievement and motivation.

Total effects. Previous achievement had the largest total effects on achievement (.363), followed by family background (.303), English proficiency (.209), and motivation (.176). Moderate total effects derived from quantity of instruction (.115). The source of the total effect on achievement from previous grades was from both direct effects and indirect effects. The total effect from motivation and quantity of instruction on achievement was due primarily to direct influences. Similarly, the total effect from family background and English proficiency included both direct and indirect effects.

Conclusions

The results of this study provide support for school learning variables as meaningful influences on academic achievement as applied to early adolescents. They also suggest that family background, gender, and English proficiency are important control variables in the study of Hispanic students. Thus, it appears theories of school learning are relevant to the learning of Hispanic students.

The findings were consistent with previous research including the examination of school learning across various ethnic groups (T. Z. Keith & Benson, 1992), high school seniors (Cool & T. Z. Keith, 1991), Mexican-American eighth graders (P. B. Keith, 1992), and educationally disadvantaged minority groups (Anderson, 1991). Previous achievement, as measured by previous grades, was the most powerful influence on academic achievement, having both strong direct and small indirect effects. Motivation, quantity of instruction, and homework had moderate total effects on achievement, primarily through direct effects. However, there are some interesting results derived from the particular learning pattern of Hispanic students, their background, or from measurement issues that deserve further comment.

The direct and total effects of quality of instruction on achievement were not large enough to become meaningful, as expected based on previous research. One possible explanation is that the influence of quality of instruction on achievement is not as important for Hispanic students as it is for the white student population. Another possibility may be simply related to age development. It could very well be that for eighth graders, as opposed

to high school students, the perception of quality of instruction is not that critical as an influence on achievement. A third possibility may be the choice of items to measure student's and parent's perceptions of quality of instruction were inadequate, although composites created for the quality variable closely matched those created by NCES (1991) to evaluate attitudes toward instruction and schooling for language minority groups, including Hispanics. Still, given the broad concept of quality of instruction, the present results may be in fact consistent with the inconsistency of other findings indicating that quality seems to have meaningful total, but not direct effects (e.g., Carroll, 1989).

Similarly, a much larger and consistent influence has been reported elsewhere for quantity of instruction measured by coursework taken (Anderson, 1991; Cool & T. Z. Keith, 1991; T. Z. Keith & Benson, 1992). The moderate effects reported here may be a product of limitations in the choice of courses in middle school, different coursework emphasis (English or math oriented), lack of variation in the quantity of instruction offered at the eighth grade level, or due to some unavoidable measurement problems related to self-report of courses taken (see NCES, 1991). At any rate, the justification for the inclusion of both quality and quantity of instruction variables in the model still holds. Cool and T. Z. Keith (1991) suggested the effect of homework on achievement can be spuriously inflated if quantity of instruction is not considered in the model.

With the inclusion of variables relevant to the family and language background of Hispanic students, this study was able to present a more accurate picture of both the direct and indirect influence of school learning variables on academic achievement. The inclusion of student's English proficiency (often overlooked in school learning models) was of particular

importance because it controls for language skills essential for attaining basic achievement levels (NCES, 1992a). English proficiency along with family background, had both direct and indirect meaningful effects on achievement, and provided further support for their inclusion when studying language minority students. The gender influence on achievement was not surprising and appear to support the notion that Hispanic female students are educated within the context of cultural subordination (see Garza & Lipton, 1984).

The acute differences in family background across Hispanic subgroups point to the question of whether English proficiency and SES influence differently the academic achievement of Mexican, Cuban, Puerto Rican, and other Hispanic students. It may be possible the family background of the student masks or inflates school learning variables and achievement outcomes. Furthermore, because NELS:88 relied on student self-reported data, there may be a problem with the identification of Hispanicity and other background information essential for the analysis of the school learning model.

Implications and Recommendations for Future Research

Several research questions and issues were derived from this study. There are questions about the lack of uniformity in operational definitions of important variables (e.g., quality of instruction, motivation, quantity of instruction). What constitutes basic academic coursework across schools, grades, and across geographical regions of the country? What are the critical indicators of quality of instruction and schooling? What other aspects of motivation should be addressed? Other issues point to limitations in the availability of appropriate indicators or proxies of variables, and measurement problems of self-reported data

in large data sets. Measures more closely reflecting the curriculum content of the schools would likely improve future research, especially when conceptually broad variables as the ones included here are under examination.

Overall, the quality of the responses of eighth grade students in NELS:88, shows adequate reliability and validity for research purposes (NCES, 1991). Future analysis using latent variable analysis (e.g., LISREL, Joreskog & Sorbom, 1989) to control for unreliable measures may be beneficial. The multi-sample portion of LISREL analysis would provide for the simultaneous evaluation of school learning variables across Hispanic subgroups, while still controlling for their background variables.

Despite the caveats, this study provided evidence supporting the importance of various conditions influencing academic performance of middle school Hispanic students. The findings reported in this study should be of value to practitioners interested in applying school learning theory in the classroom, and to multicultural educators who are interested in the learning needs of minority groups. A greater knowledge of the learning needs of ethnic groups may be a prerequisite for a more tolerant environment in the classroom. Teachers must realize that all students, regardless of ethnic affiliation, deserve an equal opportunity to learn in school. Multicultural educators need to recognize that a multicultural curriculum is adequate for all children and not only for Hispanic or Asian students. Hispanics, for instance, should learn about the society as a whole and to respect the cultural background of other students.

The results are particularly relevant because many of the variables studied have potential as manipulable tools for educational interventions at a time when early adolescents

are exposed to critical situations which may influence them later in school. Homework, for example, is a very cost-effective instructional tool that can be manipulable and can serve different purposes at different grades. Graded homework and teachers' comments on assignments may produce positive results in the efforts to raise achievement. Furthermore, teachers need to understand how to motivate Hispanic students who sit passively in the classroom, respect their cultural background and family ties, and promote their self-confidence. These are some areas that require some attention to help Hispanic students, whose "road to academic success" appears to be "under construction," become part of the mainstream in the American classroom.

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Appendix A

Description of NELS:88 Items and Composites

Items were selected from the NELS:88 student and parent files as individual measures or composites based on previous research and related theory. In addition, factor analysis was conducted to identify items to measure quality of instruction, motivation, and quantity of instruction. Only items with factor loadings of .40 or greater were retained.

1. Family Background. This variable was measured by socioeconomic status (SES), a composite computed by NCES including father's and mother's education, father's and mother's occupation, and family income. Responses were standardized (z-scores) and averaged. The range was -2.52 to 1.87. SES items were reliable and well within acceptable standards of validity (NCES, 1991).

2. English Proficiency. Four questions were used to measure students' English proficiency including how well they understood spoken English, and how well they spoke, read, and wrote English. Responses (1 = "Not very well" to 4 = "Very well") were standardized (z-scores) and averaged. The range was -4.34 to .49, and the estimated reliability was .90.

3. Gender. A dummy variable coded 1 = males and 2 = females.

4. Previous Grades. This variable was a composite of previous grades created by NCES standardizing (z-scores) and averaging grades in math, English, science, and social studies since grade six. The range was ..50 to 4.0. Internal consistency was high (NECS, 1991). Since it is essential to control for previous achievement in school learning research

(Walberg, 1986), and because NELS does not provide tests of intellectual ability, previous grades were used as proxy of previous achievement. The use of grades as an adequate measure of prior learning is supported by research (Walberg, Fraser, & Welch, 1986) even though some disadvantages (e.g., meaning may vary across classes and schools) may be apparent. Grades may be more valid measure of learning than test scores because they can be more content specific (Wentzel, 1989), provide a continuous measure of academic progress (Terwilliger, 1971), and because they may be more responsive to improvement through increased motivation (Natriello & McDill, 1986).

5. Quality of Instruction. This variable was an average of ratings to various questions about quality of instruction and overall school quality. The student component included four items: "students get along with teachers," "there is real school spirit," "discipline is fair," and "the teaching is good." The parent component included questions about whether the school placed high priority on learning, was preparing student well for high school and college, and satisfaction with education child had received. Items were converted to z-scores and averaged. Ratings ranged from -3.294 to 1.91. A reliability of .77 was estimated using the formula provided by Guilford (1954, p. 393).

6. Motivation. Motivation emphasized educational aspirations ("how far in school do you think you will get?," "how sure that you will graduate from High School?," "how sure to continue further than High School?"), perceived competence ("able to do things as well as others," "satisfied with myself," "I feel useless at times," "at times I think I am no good at all," "students in class see respondent as good student," "I feel put down by my teachers," "how often come to class without homework"), and student self-confidence ("afraid to ask

questions in math, English, science, and social studies classes"). Each item was converted to z -scores and averaged. The range was -4.06 to 1.83. A reliability of .82 was estimated using the Guilford (1954, p. 393) formula.

7. Quantity of Instruction. This variable was a composite of regular math, algebra, science, biology, earth science, English, history, social studies, foreign language, and computer education (1 = "Do not attend"; 2 = "Attend"); and remedial math and English courses (reverse coded). Course items were standardized (z scores) and averaged. The range was -1.29 to 1.25, the reliability was .49 (using the formula provided by Guilford, 1954, p. 393). The low reliability indicates that Hispanic students frequently reported enrollment in courses that would generally be mutually exclusive such as remedial math and advanced math. Although this problem has been recognized in NELS:88 follow-up studies, there is no way to know which patterns of responses are "correct" (NCES, 1991).

8. Homework. This variable is a composite created by NCES considering the number of hours per week spent in homework. The range was none to 21 or more hours spent in homework per week.

9. Academic achievement. Academic achievement was an average of the NELS reading, mathematics, science, and social studies standardized tests (T scores) developed by the Educational Testing Service. The range was 28.54 to 70.61, the estimated reliability was .86 (NCES, 1991, 1992a, 1992b). Coefficient alpha reliabilities for the tests were .84 for reading, .90 for mathematics, .75 for science, and .83 for social studies (NCES, 1992b).

Table 1

Variable Correlations, Means, and Standard Deviations

Variable	1	2	3	4	5	6	7	8	9
1. Family Background	1.00								
2. English Proficiency	.254	1.00							
3. Gender	-.027	.085	1.00						
4. Previous Achievement	.165	.112	.071	1.00					
5. Quality of Instruction	.025	.001	.030	.222	1.00				
6. Motivation	.255	.244	-.002	.497	.254	1.00			
7. Quantity of Instruction	.077	.150	.067	.185	.077	.198	1.00		
8. Homework	.101	.009	.048	.199	.145	.194	.104	1.00	
9. Achievement	.358	.282	-.039	.419	.116	.413	.231	.184	1.00
M	-.570	-.000	1.502	2.754	-.000	-.006	-.059	3.866	46.24
SD	.743	.892	.500	.732	.780	.733	.644	1.379	7.892

Note. N = 2,645; minimum pairwise N = 2,149.

Table 2
Direct, Indirect, and Total Effects of Previous Achievement, Quality of Instruction, Motivation, Quantity of Instruction, Homework, and Background Variables on Hispanic-American Eighth Grade Student's Academic Achievement

Variable	Effects		
	Direct	Indirect	Total
Family Background	.220 (2.337)	.083 (.882)	.303 (3.219)
English Proficiency	.148 (1.309)	.061 (.540)	.209 (1.849)
Gender	-.074 (-1.168)	.026 (.410)	-.048 (-.758)
Previous Achievement	.260 (2.803)	.103 (1.110)	.363 (3.913)
Quality of Instruction*	--- (.374)	.037 ---	.037 (.374)
Motivation	.156 (1.680)	.020 (.215)	.176 (1.895)
Quantity of Instruction	.111 (1.360)	.004 (.049)	.115 (1.409)
Homework	.070 (.401)	--- ---	.070 (.401)

Note. Standardized coefficients are listed first; unstandardized (metric) coefficients are shown in parentheses underneath.
* Direct effect constrained to zero.

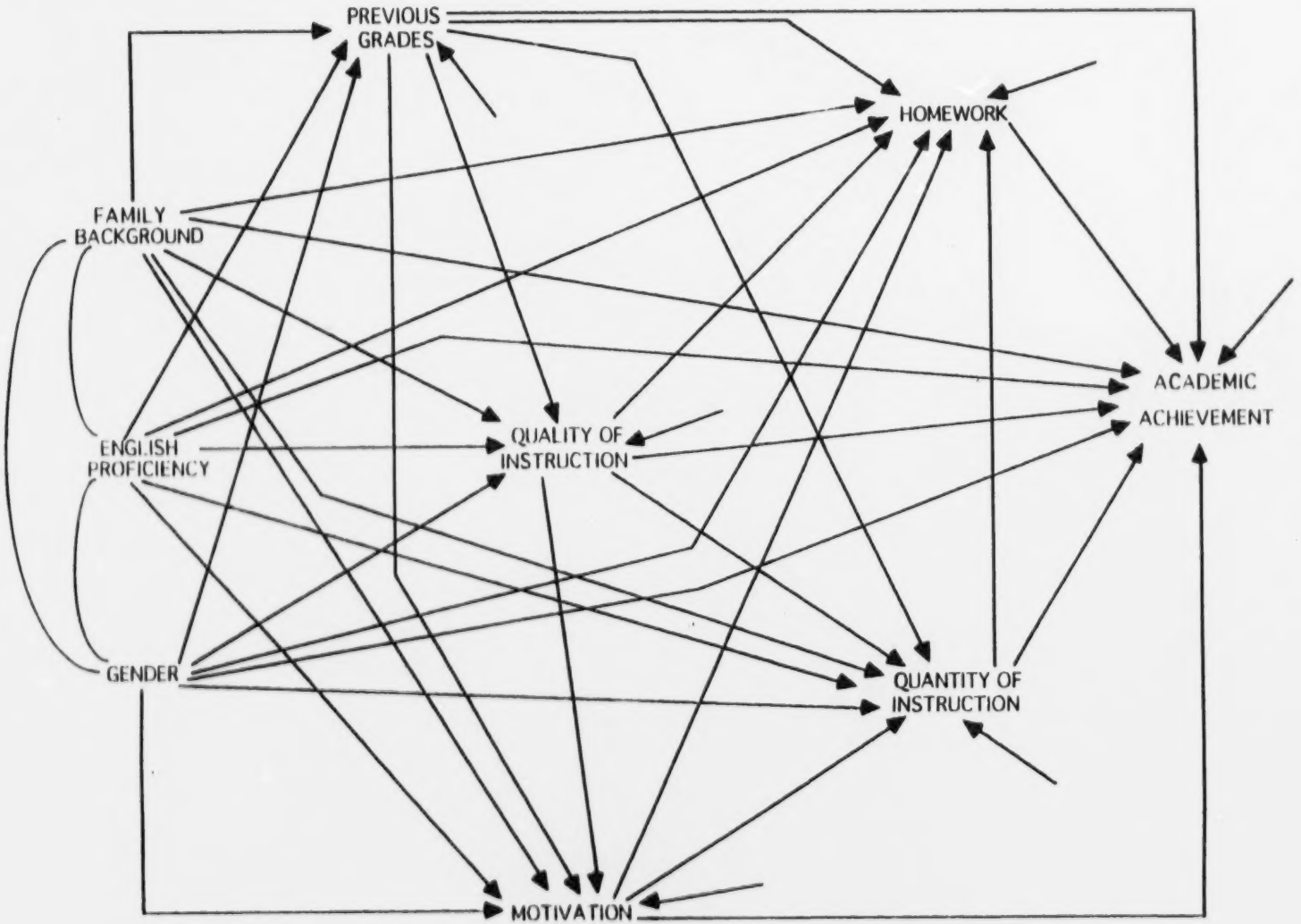

Figure 1 . School learning model for Hispanic-American eighth grade students

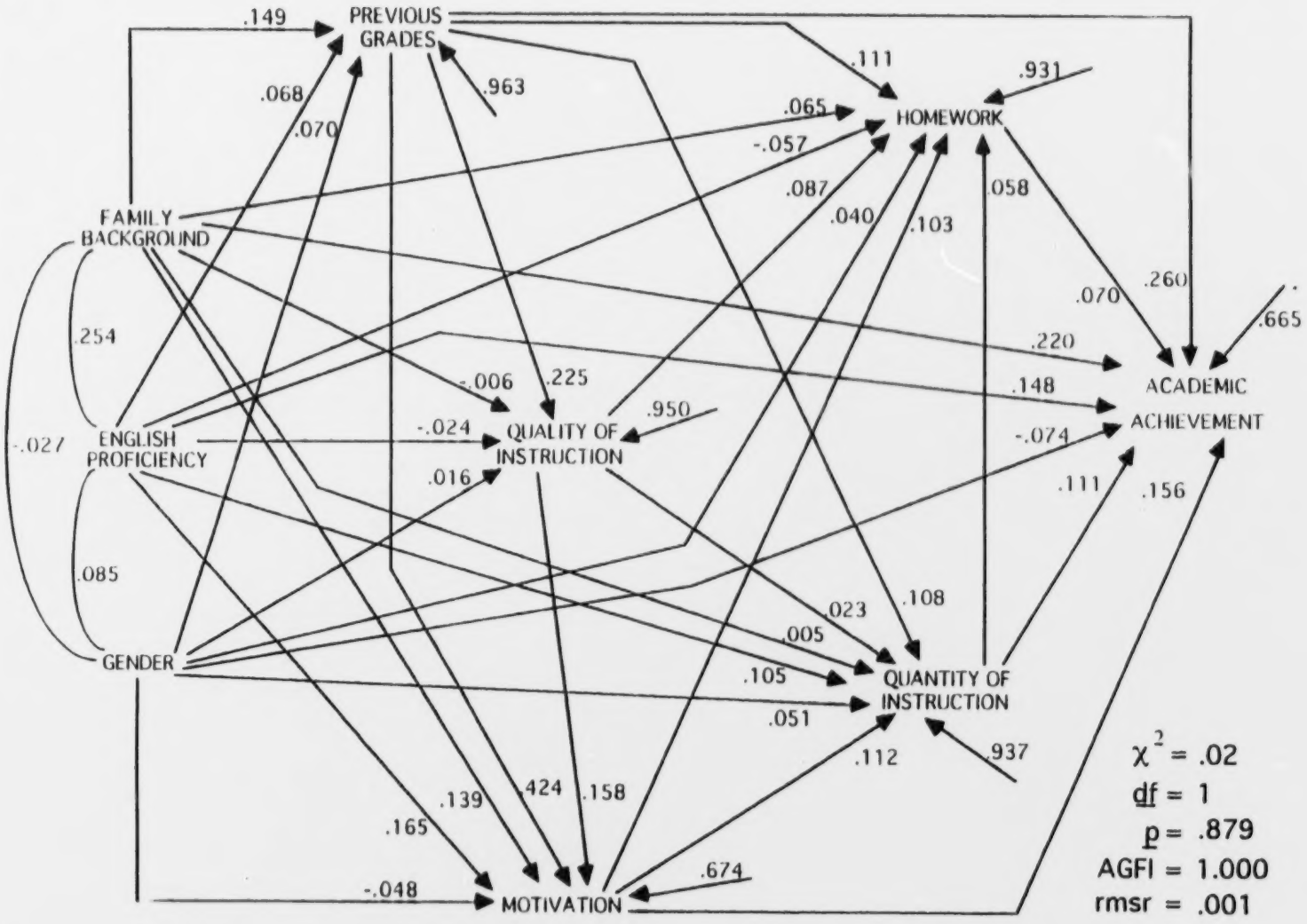

Figure 2 Effects of school learning variables on Hispanic-American eighth grade students' academic achievement.